

## **TITLE**

### **Styling and Curling Hairbrush**

## **CROSS REFERENCE APPLICATIONS**

5           This application claims priority from German  
application no. 202 18 783.7 filed Dec. 3, 2002.

## **FIELD OF INVENTION**

10           The present invention relates to a styling and curling  
hairbrush with an elongated tubular body for attachment on a  
hot air blower.

## **BACKGROUND OF THE INVENTION**

          Styling brushes which can be attached to a hot air  
15   blower or permanently mounted as part of a hair styling tool  
are well known in the art. Generally, the body of the brush  
had an inner hollow volume following the longitudinal extent  
of the body forming an air channel to act as a collector.  
The air channel has an open end to allow a hot air stream to  
20   flow into the air channel. Air escape openings connect the  
air channel with the outer shell surface of the tubular  
body. Several rows of bristles are distributed  
circumferentially with respect to the tubular body. The

rows of bristles can be formed by individual bristle elements of synthetic material or steel, or by tufts of bristles. The individual bristle rows are disposed along the longitudinal extent of the tubular body.

5       The flow of hot air is a limiting factor in the amount of heat supplied to the hair to be shaped. This can be limited when desirable close spacing of the individual bristles prevents further perforation of the tubular body. In order to supply more heat to the hair to be shaped prior  
10 art styling and curling hairbrushes have an additional air stream flowing along the shell surface of the tubular body. To accomplish this the hairbrush has an air stream divider to direct a portion of the hot air stream flowing to the hairbrush onto the outside of the tubular body. This air  
15 stream flows through the individual bristles or bristle rows at their base.

      The prior art curling hairbrushes do shape hair with the heat supplied via the hot air stream. However, a limitation of the prior art curling hairbrush is that hair  
20 which is next to the exit openings of the outer air stream gets more heat than the hair that is farther from the air exit openings. This is caused by the hair in close proximity to the air exit openings blocking the path of the

air stream to the more remote hair and/or hair bristles.  
Even if it may occasionally be desired to attain a different  
shaping result over the useful length of such a hairbrush  
within the same shaping process, it would be desirable to  
5 have a styling and curling hairbrush available with which  
shaping results are identical over the entire useful length.

Building on the discussed prior art, the invention  
addresses the problem of a styling and curling hairbrush in  
which the disadvantages listed under the discussed prior art  
10 are at least largely avoided.

This problem is solved in the present invention when  
the bristle rows of the brush are spaced apart. The  
individual bristle rows are disposed next to an air guidance  
element which is closed in the radial direction and forms an  
15 air flow channel open to the adjacent bristle row or rows.

#### **SUMMARY OF THE INVENTION**

The primary aspect of the present invention is to  
provide a hot air styling hair brush where the heat provided  
20 to the hair to be styled is largely even over the effective  
length of the brush.

Other aspects of this invention will appear from the  
following description and appended claims, reference being

made to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the present invention the body of the brush has an  
5 inner hollow volume following the longitudinal extent of the body forming an air channel forming a collector. The air channel is open at one end to allow a hot air stream to flow into the air channel. Air escape openings connect the air channel with the outer shell surface of the tubular body.  
10 Several rows of bristles are distributed circumferentially with respect to the tubular body. The bristle rows are spaced apart with respect to one another.

Between each bristle row is an air guidance element which is parallel to the bristle rows and also follows the  
15 longitudinal extent of the tubular body. Each air guidance element forms an airflow channel which is closed in the radial direction. The channel is open toward at least one adjacent bristle row or has openings in this direction. The air guidance element forms a guide sheet held at a spacing  
20 apart from the tubular body, beneath which a sheathing air stream can be transported. The guide sheet also keeps open the flow channel formed by the air guidance elements when the hairbrush is being used. Hair does not block the

longitudinal flow in air guidance channel when the brush is used, even if the hair is tightly wrapped around the body.

Several such air guidance elements are disposed about the tubular body. The spacing of the air guidance element prevents hair from wrapping into the base of the bristle rows. The keeps both the flow channels of the air guidance elements and the base of the bristle rows are kept free for airflow. This allows a sheathing air stream acting directly onto the bristle rows when the hairbrush is used to flow along beneath the hair held away from the outer shell surface and to more uniformly transfer the heat to the hair. The sheathing substream in each flow channel forms a heat reservoir so that the hair in the area of the useful surface of the brush receives sufficient heat.

In one embodiment the flow channels formed by the air guidance elements are closed at their free end or in the proximity of their free end so that the occurring eddies enhance the heat transfer from the air stream to the hair.

Additionally, to supplement the sheathing air stream, hot air also exits from the interior of the tubular body at air exit openings following the longitudinal extent of the tubular body of the brush. Therefore, the sheathing air stream is both deflected toward the hair to be shaped and

turbulences are generated which enhance the heat transfer in the region of the bristle rows.

In a preferred embodiment the air guidance elements are fabricated of metal, for example of aluminum. When the  
5 brush is being used these elements store heat, which is transferred from the outside of the air guidance elements to the hair in contact with them. This means that the air guidance elements serve both for guiding sheathing air streams and for forming elements which function as heat  
10 plates.

The segments projecting radially outwardly of the air guidance elements preferably form a slotted sleeve, with one bristle row each disposed in the slotted regions. The air guidance element can be structured differently. In one  
15 formation, in which such an air guidance element is open substantially directed to an adjacent bristle row, it has the form of an O and is curved corresponding to the curvature of the outer shell surface of the tubular body. It can also be provided that, while the air guidance  
20 elements are closed in the radial direction they are open toward both adjacent bristle rows. In this case such an air guidance element is developed to have the form of a T in

cross section. Such an air guidance element forms consequently two flow channels.

The bristle rows and also the air guidance elements of the styling and curling hairbrush can be developed such that  
5 they extend in straight lines following the longitudinal extent of the tubular body. However, these can also be disposed such that they encompass the tubular body in the manner of a spiral.

The styling and curling brush can be associated with a  
10 hot-air blower disposed in a handle. It is also possible to develop this hairbrush with a coupling piece so that it is an attachment onto a handle with a hot-air blower, commonly known as a hair dryer. The hot-air blower can subsequently also be employed for other hair shaping attachments.

15

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a schematic side view of a styling and curling hairbrush.

20 Fig. 2 a cross-sectional view of the hairbrush taken along line A-B of Figure 1.

Fig. 3 is a schematic side view of the present invention  
with the hot air blower integrated into the handle

Before explaining the disclosed embodiment of the  
5 present invention in detail, it is to be understood that the  
invention is not limited in its application to the details  
of the particular arrangement shown, since the invention is  
capable of other embodiments. Also, the terminology used  
herein is for the purpose of description and not of  
10 limitation.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. 1, a styling and curling hairbrush 1,  
which in the depicted embodiment is an attachment for a hot-  
15 air producing hand-held device, has a coupling piece 2, with  
which the hairbrush 1 can be connected to a grip piece (not  
shown) including a hot air blower. The coupling piece 2 is  
developed as an annular body and can be fitted on to the  
grip piece. The hairbrush 1 further comprises an air stream  
20 divider 3 next to the coupling piece 2, which divides a hot  
air stream introduced into the coupling piece 2 into  
sheathing air stream exiting through several



circumferentially distributed openings 4 and in to the longitudinal extent of the hairbrush 1.

In the direction toward the free end of the hairbrush 1 the air stream divider 3 is adjoined by the brush section 5 of the hairbrush 1. The brush section 5 - as shown in the cross section of Figure 2 - comprises a cylindrical tube 6, whose inner hollow volume forms an air channel 7.

In the tube 6 bristle tufts are anchored in three bristle rows  $B_1$ ,  $B_2$  and  $B_3$  disposed parallel to one another. The bristle rows substantially follow the longitudinal extent of the hairbrush 1. A bristle row can be formed by a single row of bristles or it can also be formed by several parallel bristle rows and/or offset with respect to one another. Or the bristle row arrangement can be disposed in groups circumferentially with respect to the tubular body, with each group being spaced apart from the adjacent group.

To simplify the drawing for clarity, Figure 1 shows the hairbrush 1 with only a few bristle tufts indicated. These emerge from the shell surface of the bristle section 5 through the openings 8 only shown in one region. The air channel 7 of the tube 6 is connected via several air exit openings 9, developed in the form of elongated holes, with

the shell surface of the bristle section 5. Tube 6 is closed toward its free end forming a taper 10.

A sleeve 11 is set torsionally tight onto the tube 6, which is shown with three air guidance elements  $L_1$ ,  $L_2$ ,  $L_3$ .

5 The inner section of sleeve 11 is in contact on tube 6 and forms a shell around tube 6 with the same properties as tube 6. The air exit openings 9 also penetrate the sleeve 11 and the sleeve 11 has the openings 8 for allowing the bristle tufts to penetrate through them.

10 In the following the air guidance element  $L_1$  is described in further detail. The two further air guidance elements  $L_2$  and  $L_3$  are structured correspondingly. The air guidance element  $L_1$  is formed into a curved U-form flow channel 12. The channel is closed in the radial direction  
15 with respect to tube 6 through an outer segment 13 of air guidance element  $L_1$ . This outer segment 13 of air guidance element  $L_1$  assumes the function of a guide sheet. The outer segment 13 is connected by base segment 14 with the shell of sleeve 11 encompassing tube 6. The outer segment 13 is  
20 curved corresponding to its distance from the shell surface of tube 6 and corresponding to its concentric disposition to tube 6. Like the attachment of base segment 14 to outer segment 13, the front edge 15 is rounded off to avoid damage

to the hair to be shaped. The flow channel 12 formed by air guidance element  $L_1$  is open in the tangential direction and consequently toward bristle row  $B_1$ .

Due to the curved formation of the air guidance element  
5  $L_1$ , on the backside of flow channel 12 a further flow  
channel 16 is formed. The outer edge 16a of flow channel 16  
is formed by base segment 14. In the depicted embodiment  
example flow channel 12 is smaller than flow channel 12.  
Flow channel 16 is open toward the other bristle row  $B_3$ .

10 Sleeve 14 and air guidance elements  $L_1 - L_3$  are  
preferentially produced of aluminum, for example by way of  
extrusion molding. Other suitable materials could be used.

During operation of the hairbrush 1 a hot air stream 17  
flows via the coupling piece 2 and the air stream divider 3  
15 into air channel 7 and out through openings 4. This divides  
the air stream 17 into an air stream flowing into air  
channel 7, shown by vector X and the sheathing air streams  
flowing through air channels 12 and 16, shown by vector Y.

If a strand of hair is wound around brush section 5 the  
20 hair concentrically encompasses tube 6 and is in contact  
with the outer surface 13a of the outer segments 13 of air  
guidance elements  $L_1 - L_3$ . The strand of hair is held at a  
spacing from the base surface of sleeve 11 by the air

guidance elements  $L_1 - L_3$ . Consequently, hot air can be supplied to the strand of hair to be shaped from the air exit openings 9 of the air channel 7, as shown by arrow Z.

Simultaneously the hair strand is exposed to the  
5 sheathing air stream, which is transported in the flow channels 16 of the individual air guidance elements  $L_1 - L_3$  parallel to the longitudinal extent of the bristle rows  $B_1 - B_3$ . The heat transported in this sheathing air stream 18 is sufficient to warm the hair strand to be shaped uniformly  
10 over its entire width. The meeting of the hot air streams transported from the air exit openings 9 and the flow channels 12, 16 results in turbulences, such that heat transfer from the air stream onto the hair is facilitated.

Forming sleeve 11 and air guidance elements  $L_1 - L_3$  of  
15 aluminum helps the warming process of the hair due to the heat conducting properties of aluminum. During operation of the hairbrush 1 these aluminum component parts are warmed by the hot air stream transported through the flow channels 12, 16 and this heat is transferred to the hair strand due to  
20 the large-area contact on the hair strand to be shaped.

Although the preferred embodiment is described having three rows of bristles and three air guidance elements, it

is to be understood that more or less could be used,  
depending on design considerations.

The description of the invention elucidates that the  
handling of the described styling and curling hairbrush,  
5 compared to prior art, is not only improved but also that a  
better hair shaping result can be attained. In the  
embodiment example the styling and curling hairbrush has  
been described with the bristle rows stationary. The  
invention can also be realized in which rows of bristles are  
10 retractably disposed, such that these can be retracted into  
the tube for detaching the hairbrush from the shaped strand  
or portion of hair.

FIG. 3 shows the present invention with the brush  
section 5 is part of an integrated hot air styling brush 101  
15 with the hot air blower mounted in the handle 102. The  
coupling piece 201 is attached to the handle 102. All other  
pieces are identical.

Although the present invention has been described with  
reference to the disclosed embodiments, numerous  
20 modifications and variations can be made and still the  
result will come within the scope of the invention. No  
limitation with respect to the specific embodiments  
disclosed herein is intended or should be inferred. Each

apparatus embodiment described herein has numerous equivalents.

## List of Reference Symbols

5	1	Hairbrush
	2	Coupling piece
	3	Air stream divider
	4	Opening
	5	Brush section
10	6	Tube
	7	Air channel
	8	Opening
	9	Air exit opening
	10	Taper
15	11	Sleeve
	12	Flow channel
	13	Outer segment
	14	Base segment
	15	Edge
20	16	Flow channel
	17	Hot air stream
	18	sheathing air stream
	101	hot air styling brush

102 handle

201 coupling piece

$B_1 - B_3$  Bristle row

5  $L_1 - L_3$  Air guidance element